FOREST PEST LEAFLET 154

Phomopsis Blight of Junipers

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Phomopsis blight has been a troublesome problem for over 70 years in nurseries producing juniper seedlings and grafts. *Phomopsis juniperovora*, the fungus causing this blight, is common in the Great Plains from North Dakota to Texas and eastward to the Atlantic coast.

Hosts

Losses have been most severe in seedling and transplant beds of eastern redcedar and Rocky Mountain juniper. Other junipers are susceptible, as are some species in the genera *Chamaecyparis*, *Cupressus*, and *Thuja*. Arizona cypress seedlings have been seriously damaged in some southern states.

Description of Damage

Young, nonwounded needles are susceptible to infection throughout the growing season. Small yellow spots appear on infected needles of eastern redcedar and Rocky Mountain juniper 3 to 5 days after inoculation of seedlings. The fungus permeates young needles and rapidly invades young stem tissues. As a result, terminals and branches become light in color, then red-brown, and finally ashen gray. Lesions on larger stems frequently develop into cankers. Stems of 1- and 2-year-old seedlings are frequently girdled at the base of infected branches. Older stock is less likely to be killed because stems over one-third of an inch in diameter are usually not girdled, and the fungus does not spread far below cankers. Survival of even lightly infected nursery stock in the outplanting site is very poor as the disease continues to develop on new shoots.

Infected junipers established in landscape plantings may become unsightly because of numerous dead branch tips. Such older trees are seldom killed because only small-diameter stems are girdled. For this reason, Phomopsis blight has not caused significant damage in natural

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stands of junipers. Pruning can increase damage to established junipers, since it forces development of juvenile foilage which is highly susceptible to the fungus.

Total loss of first-year seedlings is common in epidemic years if control measures are not used. Losses are particularly high in areas where water tends to stand and in new seedlings adjacent to beds of infected stock.

Damage due to drouth may be confused with Phomopsis blight. In both cases tips of branches may be killed. However, the line of demarcation between green and dead tissue will be sharp in Phomopsis blighted seedlings and gradual in seedlings affected by drouth. Damage from the lesser cornstalk borer can be distinguished from Phomopsis blight by the straw color of the dead tops and by the feeding wounds on the lower stem and taproot. Another fungus, *Cercospora sequoiae*, which causes a blight of junipers and other species in the Cupressaceae, can be easily distinguished from Phomopsis blight. *Cercospora* affects only the needles and infection starts on the oldest needles of lower branches and spreads upward and outward, whereas Phomopsis infection starts in newly developed needles.

Some saprophytic fungi found on dead juniper tissues resemble *P. juniperovora*. These fungi produce pycnidia on the same tissues as *P. juniperovora*. They have hyaline spores with dimensions similar to those of A-spores of *P. juniperovora*, but usually without the two characteristic oil globules. The Phomopsis blight fungus is readily distinguished from these saprophytes by using cultural media such as potato dextrose agar or malt extract agar. On such media *P. juniperovora* produces a characteristic deep yellow coloration, usually accompanied by the appearance of bright orange-red crystals.

Life History

Spores produced in fruiting bodies (pycnidia) formed on leaves and stems of seedlings infected the previous year are the most important source of inoculum early in the growing season. Pycnidia with viable spores may develop within 3 to 4 weeks after seedlings become infected but usually are not well developed until infected tissues have dried considerably. They are most commonly found on tissues which have turned ashen gray. The pycnidia are at first embedded in needles and stems, but partially erupt later through the epidermis (fig. 1). Spores are extruded in whitish tendrils. Two types of spores (A and B) develop in the same or different pycnidia. A-spores are colorless, one-celled, ellipsoid, contain two oil globules, and commonly are 7.5–10 × 2.2–2.8μm (fig. 2); B-spores are colorless, one-celled, filamentous, slightly curved, and commonly 20.2–26.9 × 1μm (fig. 3). Intermediate type

spores occur infrequently. The perfect stage of the fungus is unknown. The fungus can persist as mycelium for as long as 2 years in dead parts of infected plants, and produce spores.

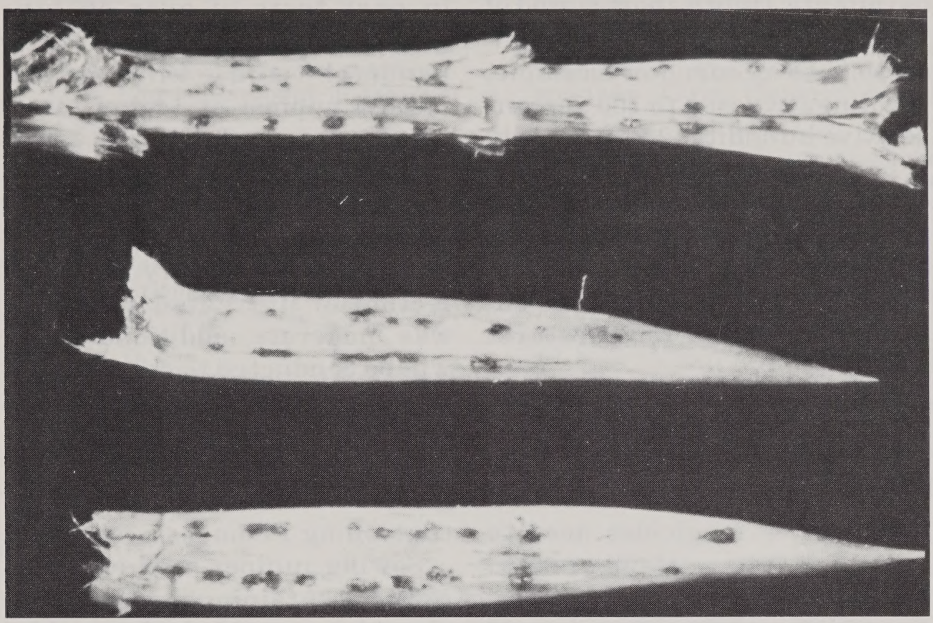

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Figure 1.—Pycnidia of *Phomopsis juniperovora* on stem and leaves of eastern redcedar.

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Figure 2.—A-spores of *Phomopsis juniperovora.* (Stained with cotton blue.)

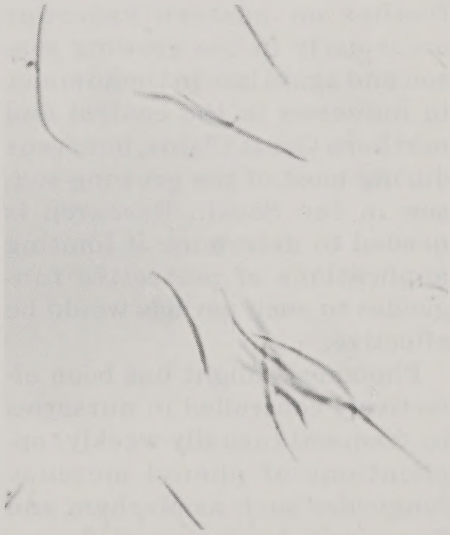

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Figure 3.—B-spores of *Phomopsis juniperovora.* (Stained with cotton blue.)

Spores are distributed primarily by water splash. Infection is caused by the A-spores; the filamentous B-spores do not germinate. Only a short period of high humidity is needed for infection to occur: for example, seedlings exposed to 100 percent relative humidity (24 °C) for only 7 hours can become infected. Spore germination, germ-tube development and infection are optimum near 24 °C; however, disease development is enhanced by higher temperatures (32 °C).

Control

Protective fungicides need to be applied frequently in order to protect susceptible new foliage. Fungicide applications could possibly be limited to periods in which flushes of new growth occur. Commonly, new growth flushes on eastern redcedar occur early in the growing season and again late in the summer in nurseries in the central and northern Great Plains, but occur during most of the growing season in the South. Research is needed to determine if limiting applications of protective fungicides to such periods would be effective.

Phomopsis blight has been effectively controlled in nurseries by frequent (usually weekly) applications of phenyl mercury fungicides such as Merbam and Puratized Agricultural Spray. Now that mercury fungicides cannot be used, other effective fungicides need to be found; however, no effective nonmercury fungicides have been found in past tests of over 40 fungicides. In recent tests (1973), benomyl and thiophanate methyl applied at 14-day intervals from early June to late September effectively controlled Phomopsis blight in 2-year-old eastern redcedar seedlings in a South Dakota nursery. Since infection of untreated seedlings was moderate, additional tests will be conducted to determine if these fungicides will also be effective under high infection conditions. Benomyl is the only fungicide now registered for use in controlling Phomopsis blight.

Sowing juniper seed adjacent to beds containing juniper stock should be avoided if possible. Poorly drained areas should also be avoided since losses are often greater where water tends to stand. If overhead sprinklers are used, seedlings should be irrigated so that the water dries before nightfall. Because shading frames increase the length of time that moisture remains on foliage, they should not be used unless absolutely necessary. Junipers or other hosts of this fungus should not be used in nursery windbreaks or in landscape plantings on nursery grounds, since they may be a source of inoculum (spores) for nursery stock. Such trees are likely to be extensively infected if pruning results in development of juvenile foliage.

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Warning: Recommendations for use of fungicides are reviewed regularly. The registrations on all suggested uses of fungicides in this publication were in effect at press time. Check with your county agricultural agent, State agricultural experiment station, or local forester to determine if these recommendations are still current.